

Abstract Submitted
for the SHOCK15 Meeting of
The American Physical Society

Shock-induced phase transition on $\text{Y}_2\text{O}_3\text{:Eu}^{3+}$ studied by photoluminescence HIROAKI KISHIMURA, SHO HAMADA, ATSUSHI ARUGA, HITOSHI MATSUMOTO, National Defense Academy — A series of shock-recovery experiments on $\text{Y}_2\text{O}_3\text{:Eu}^{3+}$ powder was carried out by the impact of a flyer plate accelerated by a single-stage powder-propellant gun. 5.038-g of samples were pressed into copper capsules at 64% of the theoretical maximum density (TMD) of the powder. The recovered samples were characterized by X-ray diffraction (XRD) analysis, Raman spectroscopy, and photoluminescence (PL) spectroscopy. The XRD, Raman, and PL results of samples shocked at pressures of 13 GPa indicated that a phase transition from a cubic phase (C-type) to a monoclinic phase (B-type) occurred. The recovered samples shocked at 21 and 25 GPa consisted of $\text{Y}_2\text{O}_3\text{:Eu}^{3+}$ with the C-type and the B-type. Although the sample shocked at pressures of 35 GPa was consisted of the C-type and the B-type, proportion of the B-type derived from the XRD peaks decreased and no PL peaks from the B-type were observed. For recovered samples shocked at pressures of 48 GPa and above, no signatures of the B-type were obtained. These results indicated that the shock-induced phase transition were the partial completion of the phase transition.

Hiroaki Kishimura
National Defense Academy

Date submitted: 28 Jan 2015

Electronic form version 1.4